

Article

Partner Pen Play in Parallel (PPPiP): A New PPPiParadigm for Relationship Improvement

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Abstract: Healthy romantic relationships contribute to human physical health and emotional well-being. Technologies that catalyze human sexuality such as silicone sex toys and video-conferencing are increasingly common today, and disruptive sexological artifacts such as sexbots are speculated to eventually compete directly with human-human sexuality. The consequences of these evolutionary transitions in human sociosexual behavior are entirely unknown at the individual or collective scale. Here we introduce Partner Pen Play in Parallel (PPPiP), the act of simultaneous improvisational drawing on paper without clinical supervision. In this prospective article we sketch out what PPPiP is, then provide interdisciplinary evidence from art therapy, sexology, affective neuroscience, and aesthetics to support PPPiP as a useful strategy for relationship development. PPPiP combines the advantages of individuated artistic practice with the established frameworks of improvisation and dyadic relationship interventions. Relative to traditional art therapy practices, PPPiP is less clinically oriented, features fewer external constraints, and directly encourages the dynamic integration of artistic creation with relationship co-creation. PPPiP emphasizes the importance of narrative structure and controlled novelty at multiple scales in intimate partnerships, connecting art therapy practices more directly to recent neuropsychological research. Evidence from brain imaging in improvisational and aesthetic contexts supports a model in which PPPiP synergistically activates motor and cortico-limbic neural circuits associated with skilled emotive-creative processes. PPPiP thus represents a transdisciplinary answer to the question of what will we carry from our sociosexual past towards a healthier textosexual future.

Keywords: sexbots; improvisation; intimacy; drawing; love; sex; free energy; technology; controlled novelty; long-term relationships

1. Introduction

Multidisciplinary neuroscientific investigations are providing actionable insights into complicated issues, such as the evolutionary causes of mental health issues (Badcock et al. 2017; Tschacher et al. 2017) and the ineffable experience of art (Pelowski et al. 2017). Recent advances in technologies that dynamically measure brain activity (e.g., functional magnetic resonance imaging, fMRI and electroencephalography, EEG) are allowing increasingly fine-scale observation of neural processes. Specific attention is now being paid to the response of the contemporary brain to social and artistic stimuli (Zerubavel et al. 2018; Cacioppo et al. 2013), and the integration of these neurological responses with our highly-social evolutionary past (Peterson 1999; Sapolsky 2017; Pietromonaco and Collins 2017). A primary determinant of our individual emotional experience is our perception of social status and quality of intimate relationships (Robinson et al. 2017; Wells and Dennis 2016; Sapolsky 2017). An established body of literature demonstrates the efficacy of non-molecular interventions such as relationship therapy for the improvement of individual and

collective well-being (Slayton et al. 2010; Bradbury and Lavner 2012; Halford et al. 2016). Art therapy specifically describes the usage of viewing, creating, and discussing art as a therapeutic modality (Wadeson 2010; Metzl 2016). Further development of scalable and effective interventions for intimate relationships would benefit the mental health of underserved communities (Monson et al. 2009; Bazzi et al. 2016; Jhai 2017), allow for the non-pharmacological remediation of relationship stressors, and provide a catalyst for the improvement of already-healthy partnerships.

Human sexual, reproductive, and emotional behavior are the outcomes of social dynamics over evolutionary time (Sapolsky 2017). Currently we are witnessing an evolutionarily-novel decoupling of sexual intercourse & reproduction (e.g., by accessible birth control), physical intimacy & emotions (e.g., by hookup culture (Garcia et al. 2012)), and reproduction & family (e.g., by changes in popular belief structures and the acceptance of birth-biotech) (Song 2018). The anticipated rise of disruptive sex-tech such as sexbots will complicate the situation further, by providing some humans with a non-human outlet for sexual interaction (Smith 2018). However, evidence suggests that partner affection mediates the positive relationship between sexual activity and emotional well-being in intimate relationships (Debrot et al. 2017), and that relationship satisfaction and sexual frequency are causally linked to the dynamics of non-sexual positive relationship behaviors, rather than the other way around (Schoenfeld et al. 2017). This suggests that the simple physicalist conceptions of sexuality promoted by sexbot enthusiasts may lack a significant component of what makes human-human intimate relationships emotionally satisfying during inter-orgasm intervals. We do not rule out the possibility that future sexbots may incorporate more advanced affective behaviors into their sexual repertoire. We merely claim that current sexbots cannot as of yet provide human levels of intimacy for the foreseeable future, severely limiting the emotional benefit of the sexual services that they may provide. Humans all across the ideological and techno-sexual spectrum are asking: What will we bring from our evolutionary past into our socio-techno-sexual future?

Here we draw together the research on intimate relationships, improvisation, and the neuroscience of visual aesthetics to present Partner Pen Play in Parallel (PPPiP), a low-cost and non-gendered relationship improvement technique that uses the act of artistic creation as collective self-therapy.

2. PPPiP—What and Why?

What is needed is a rigorous & action-oriented framework for the improvement of human-human intimate relations in the age of sexbots. Here we introduce Partner Pen Play in Parallel (PPPiP). PPPiP is simply the act of interactively drawing with a partner on the same sheet of paper. While structured paper-based games such as tic-tac-toe and hangman have long been deployed in childcare settings, non-clinical adult-adult improvisational activities tend to be non-paper-based (e.g., contact improv, musical performance, conversation). Art therapy specifically is the closest previous body of work to PPPiP. We emphasize similarities between art therapy and PPPiP in Section 2.2.1, and emphasize the differences between the two activities in Section 3. In the first subsection below, “What is PPPiP?”, we detail the nature of PPPiP and outline how it is practiced. In the second subsection, “Why do PPPiP?”, we provide interdisciplinary evidence from sexology, affective neuroscience, and aesthetics to address the efficacy of PPPiP in vivo. The goal of the second section is to provide a rigorous academic grounding for the use of joint-improvisational drawing sessions as a tool for intimate relationship development.

2.1. What Is PPPiP?

PPPiP is the act of two people simultaneously drawing on one piece of paper. Partners sit across from each other, or side by side if permitted by handedness. Much like a conversation, PPPiP can be practiced in public (e.g., at a bar, coffee shop, or restaurant) or in private (e.g., at home or secluded locations). Just as with conversation, partners may pick a familiar topic to elaborate on, or draw freely. To begin a drawing session, the choice of a theme (like a word, shape, or idea) can provide direction by establishing constraints on the myriad of possible drawings. The intention of the drawing session can vary across time, location, relationship status, and individual mood (i.e., is it for public or private

viewing? Does it express an idea or is it a binding contract?). The final drawing may be immediately destroyed (as a Buddhist sand mandala), or may be cherished as a form of low-tech extended memory (Jardine 2017; Froese 2015).

PPPiP requires no special tools—only pen and paper (and perhaps a stable drawing surface), which makes it particularly approachable and scalable. The choice of pens can alter the resulting drawing. Common pen combinations include thick vs. thin black pen, red vs. black pen, or even multiple colors/thickness of pens in one session. One may consider the wetness of ink as a variable—ink that takes a long time to dry will likely be smeared by one of the partners, and adds a dose of imperfection to an otherwise ‘clean’ drawing. Inexperience with drawing is not a barrier to the practice of PPPiP any more than inexperience with cooking prevents a couple from making dinner together. Artwork co-creation exists solely for the enjoyment of the process and enhancement of shared time together, and need not be evaluated critically. PPPiP does not need to be limited to close or romantic partnerships, and can be done with complete strangers as an ice-breaker or trust-building exercise, but we believe that close partnerships will benefit the most by adding PPPiP as another modality for communication. These loose suggestions for “How to PPPiP” are intentionally much less structured than previous art therapy protocols, which tend to have a defined temporal duration, artistic prompting, and conceptual content.

Two major categories of PPPiP can be delineated: drawing products with and without font. If the drawing contains font or legible textual elements, it is known as “fontplay”. Drawings without any legible textual elements are known as “pure abstraction”. In fontplay, the lettering can provide semantic meaning, as well as structural elements for possible further improvisation. Both fontplay and pure abstraction styles can include a narrative element, for example featuring a linear or circular sequence that unfolds across the page. Communication between partners is particularly important at the onset of drawing, when broad strokes are being sketched. More specific constraints on the drawing require more verbal coordination among partners. Once initiated, the process of the partner drawing can flow with or without verbal cues, as partners find each other’s rhythm. Towards the end of a session, the partners must communicate to jointly evaluate when the drawing is close to completion. The last step is to sign and date the back (or front?) of the paper, making it a paper artifact of the relationship.

In the Appendix to this paper, we present several examples of fontplay (Appendix A) and pure abstraction (Appendix B).

2.2. Why Do PPPiP?

What evidence exists to suggest that PPPiP would be an effective technique for relationship improvement? As there are currently no studies that directly test the neural or psychological efficacy of PPPiP, here we synthesize research from various fields to describe a plausible scientific basis for PPPiP as a uniquely powerful tool for relationships. We also keep in mind the sparse evidence that supports the usage of marital therapy in practice (Halford et al. 2016).

2.2.1. Evidence from Traditional Art Therapy

PPPiP is inspired by, and shares many similarities with, traditional art therapy. Wadeson (2010, p. 401) presents five advantageous aspects of art therapy relative to traditional couples therapy. As PPPiP shares these five important characteristics with previous artistic approaches to marital therapy, here we re-enumerate Wadeson’s list. As opposed to talk-only therapies, artistic interventions are Immediate (attentionally engaging), Genuine (heartfelt and expressive), allow for Spatial Expression (non-linear ordering of concepts), Permanent (resulting in a tangible outcome), and facilitate Shared Pleasure (via the inherent fun of art). Thus we conclude that PPPiP shares all five of the implicit qualitative characteristics that are hypothesized to make art therapy effective in marital contexts (Wadeson’s five-element framework). However, decades of theoretical development and clinical usage of art therapy in various individual and group counseling contexts have resulted in

relatively sparse empirical literature supporting the efficacy of traditional art therapeutic interventions (but see [Slayton et al. 2010](#), chp. 26, Slayton et al. 2010; [Snir and Wiseman 2010](#)).

2.2.2. Attention and Neural Synchrony

PPPiP induces joint attention and likely neural synchrony in a modern world where attention can be fragmented by stress and technology. Technoference is the unwanted interruption of intentional activities, for example by compulsively checking one's phone or email ([McDaniel et al. 2018](#)). By allowing technoference into the relationship, partners implicitly signal to each other their priorities. Intentional tech-free time spent together is required to counter this implicit message. If nothing else, PPPiP provides an opportunity to spend tech-free time with a partner, and in that way is similar to going on a walk or exchanging massages. Beyond the benefits of shared time together, or the simple pleasures of viewing/creating art ([Nadal and Skov 2018](#)), PPPiP induces intense joint attention on the drawing at hand. Joint attentional awareness promotes neural synchrony, the state in which multiple brains exhibit coordinated dynamics due to external entrainment. A recent study demonstrated that high-school classroom engagement was positively associated with the extent of neural synchrony among students ([Dikker et al. 2017](#)). Similarly, neural synchrony is observed between partners during cooperative but not independent gameplay ([Liu et al. 2016](#)). Additionally, dyadic gazing sessions result in neural synchrony in the gamma waveband of temporal-parietal structures between romantic partners, but not between strangers ([Kinreich et al. 2017](#)). Taken together, the evidence suggests that short-term social behavior involving joint attention (e.g., gazing or game-playing) can contribute to neural synchrony (and other physiological synchronization ([Noy et al. 2015](#))), especially in the context of long-term relations. Other work shows that increases in neural synchrony are associated with increases in mutual prosociality ([Hu et al. 2017](#)). Or in other words, "brains that fire together, like each other". PPPiP may be uniquely situated to promote neural synchrony due to the context (intimate relationship), the proximate behavior (extended periods of joint attention without technoference), and the ultimate purpose (improving the relationship).

2.2.3. Partner Improvisation

PPPiP provides a scaffold for rich improvisational dynamics within the partnership, which naturally generalize towards everyday behaviors. Time spent co-creating is more engaging and intentional than time spent consuming (e.g., watching the same movie), though of course there is space for both within a partnership. While the start of a dyadic partnership may be built upon shared interests and activities (e.g., 'Netflix and Chill', ([Resac 2018](#))), the later stages of relationship development are characterized by complex partner engagement and joint planning (e.g., vacations, dependents). To understand this phase of intimate relationship from an academic perspective implies moving towards a "second-person neuroscience" ([Schilbach et al. 2013](#)), not unlike the transition underway in molecular entomology to understand the "truly social" nature of, for example, the ant societies ([Linksvayer 2015](#)). This requires shifting analysis from individual to dyadic outcomes ([Paxton and Dale 2017](#)) and a focus on the creation of shared task representations ([Moreau et al. 2016](#)) via improvisation. Improvisation studies across many disciplines (dance, art, and conversation) have identified the psychosocial mechanisms of joint creative processes which make up a continual feedback loop: One attends to the actions of their partner, then modulates their own actions and updates their anticipation of partner actions. Interestingly, empirical work finds that the more that dancers anticipate their partners' movements, the more they kept their own movement signature ([Issartel et al. 2017](#)), and that arbitrary selection of a leader in improvisational tasks degrades partnership performance ([Noy et al. 2011](#)). In long-term partnerships, through egalitarian improvisation, each partner can act more like themselves and transcend the narrative of compromised identity in relationships. Shared creative goals for relationships are good at the level of life and page.

2.2.4. Controlled Novelty

PPPiP provides a permissive environment for enjoyable dyadic play and creative exploration. A central paradox in long-term relationships is the balance between stability/predictability and novelty/excitement (Oppenheimer 2011). Too much novelty within a relationship can be confusing, while too little novelty can lead to stagnation. PPPiP provides a strategy for controlled novelty to enter (or leave) the relationship, for example in the form of new ideas or shapes. It has been noted that the tradition of gifting newlyweds with “something old and something new” is symbolic of the integration of romantic novelty with stability and lifelong commitment (Livingston 1999). Perhaps multilevel improvisational exercises allow a safe space for local exploration of/with one’s partner and thus allow deeper relating (Baxter and Sahlstein 2001) via juxtaposition of familiarity and novelty.

2.2.5. Art on the Brain

PPPiP is intrinsically artistic, and thus provides aesthetic benefits to individuals and groups. Consumptive and generative aesthetic behaviors show hallmark patterns of brain regional activation across sensory modalities (Brown et al. 2011). Specifically, recent fMRI studies focus on the neural dynamics of individual humans while viewing art (Herrera-Arcos et al. 2017) or other images (Kawabata and Zeki 2004). Kawabata and Zeki (2004) found that representational paintings were preferred over abstract ones, however that may be explained by the fact abstract art does not activate a specific brain region, therefore distributing any statistically significant differences across the brain (Aviv 2014). With these caveats, specific brain regions could be identified as increasing in activity when viewing preferred artworks, including the bilateral occipital gyri, left cingulate sulcus, and bilateral fusiform gyri (Aviv 2014). One of the clear findings is that the perception of stimuli as aesthetically pleasing or not is associated with differential use of the motor cortex (Kawabata and Zeki 2004), demonstrating the role of somatic-sensory embodied cognition in artistic perception, as well as pointing towards the importance of abstraction and aesthetics for theory of mind (Keskin 2009). If art is created/viewed in a personalized and potentially-pleasurable intimate context (e.g., via PPPiP), it is possible that co-activation of neural pathways associated with motor behavior and working memory (Chauvigné et al. 2018) as well as abstracted aesthetics and partner bonding (Blocker and Ophir 2016) may lead to synergistic romantic and/or sexual arousal.

2.2.6. Free Energy and PPPiP (FEPPPPiP)

Lastly, several more theoretical perspectives on biological system resilience concord with PPPiP’s emphasis on collective goal-setting and reduction of relationship uncertainty. The Free Energy Principle (FEP) considers the self-organization of biological systems as a multilevel thermodynamic process (Ramstead et al. 2018). Intriguingly, the FEP provides insight into the plausible relationship-improving aspects of PPPiP by appealing to individual psychology as well as a genuine collective psychology. For biological systems across scales (Peterson 1999, 2011), skilled improvisation is required to simply maintain homeostasis (Morville et al. 2018), and complicated generative models of the world are required for true goal-oriented behavior (Peterson 1999; Seth and Friston 2016). For example, in the case of an individual brain, coordinated goal planning and execution requires inter-hemispheric communication as well as body-brain dialectics. In the case of a relationship, planning and communication are also crucial, if not physiologically imperative. From the individual perspective, effective anticipation of a partner’s behavior during joint improvisational tasks requires the construction of a generative model of the partner’s expected dynamics (Constant et al. 2018). From observing exactly how a partner draws a curve, to inferring the object they are attempting to draw, to understanding how the drawing as a whole fits into the narrative trajectory of the relationship, PPPiP is an exercise in strengthening one’s neural representation of a partner. At the scale of the relationship, the act of collective goal planning & execution is equivalent to proof of collective integrity (Friston 2017). Thus, from the perspective of the FEP, PPPiP goes beyond simply enriching

the lives of individual humans in the partnership, and is the act of collective self-evidencing—literally the relationship itself.

3. Differences between PPPiP and Traditional Art Therapy

While deeply inspired by traditional art therapeutic interventions in the field of Marriage and Family therapy, PPPiP displays several important differences. We highlight these differences to differentiate PPPiP from previous art therapeutic approaches. First and perhaps most importantly, traditional art therapy has focused on clinical inpatients going through individual psychosocial pathologies (Wadeson 2010, chp. 7–20), or romantic couples involved in marital and family counseling (Metzl 2016; Snir and Wiseman 2010). PPPiP is intended for use by romantic couples before, after, and during such individual or collective crises. In addition, PPPiP may be spontaneously performed with strangers or non-romantic partners. In other words, PPPiP is a tool for relationship strengthening, development, and alignment that is non-competitive with traditional art therapeutic approaches, for example, by a licensed marriage and family therapist (MFT). Second, traditional art therapy takes place within spatio-temporal constraints that resemble other sorts of psychotherapy (e.g., weekly meetings for 1–2 h, in an office, with a supervising trained professional). PPPiP is more flexible in where and when it is carried out (e.g., for shorter or longer sessions, multiple times per day), and does not occur under the guidance or supervision of an external party. Third, traditional art therapy integrates creative production of art with the verbal aspects of therapy by proposing a “prompt” for the art, followed by an often-wordless drawing session, concluding with a discussion to explain or interpret the drawing in light of the couple’s situation. For example, the couple may be instructed to wordlessly draw an abstract representation of their relationship (Wadeson 2010, p. 404), then afterwards discuss how they felt while drawing, or how they interpret the artistic outcome. Conversely, PPPiP emphasizes that the drawing-process is in dynamic feedback with the verbal conversation occurring between the partners. This more directly integrates the PPPiP-ing with non-PPPiP life. Meaningful integration is further facilitated (in functioning couples) by the absence of an external therapist. Extended PPPiP sessions full of feedback between symbolic reinterpretation, partner-guided drawing, and conversation may lead to the emergence of unexpected meaning in situ. Lastly, traditional art therapy tends to use complex multicolor artistic media such as crayons and pastels (Wadeson 2010, p. 22; Metzl 2016, p. 10). In contrast, PPPiP could be generalized to use advanced media such as crayons or pencils, but as presented, uses only pens. Pens are simple, familiar, portable, easy to clean up after, and accessible to individuals of low socioeconomic status (SES). Ink cannot be erased or altered, other than by adding more (not unlike behavioral actions in a relationship). Novelty in PPPiP comes not from the tools/setting of the drawing, but rather from the interactions of the partners on the paper.

4. Future Directions

Here we briefly list some future directions for PPPiP-centric research. First and most generally, more research is needed to establish the efficacy of even “traditional” art therapy (Slayton et al. 2010; Wadeson 2010, chp. 26), and marital therapy in general (Halford et al. 2016). Specifically, to test our hypotheses about PPPiP’s synergistic activation of cortico-limbic and motor neural circuitry, direct fMRI/EEG could be used on strangers and romantic partners during solo and tandem drawing, for example using the experimental paradigms of Liu et al. (2016). We predict increased neural synchrony between partners than between strangers in all task cases, and increased neural synchrony in PPPiP conditions versus isolated tandem drawing conditions. It would be interesting to then correlate the degree of partner neural synchrony during PPPiP to self-reported measures of relationship satisfaction and objective measures of relationship outcome (e.g., divorce rate).

Graphonomic research suggests that viewing altered text leads to altered neural dynamics (Sussman et al. 2018), and it would be interesting to see if there are unique neural patterns arising from the viewing/co-creating of altered text in a social context. A more formal meta-analysis of brain regional activation during PPPiP would explore functional overlap between neurological paradigms

that consider social interaction, long-term partnership, viewing art, creating art, and improvisation. Analysis of brain response to PPPiP in children might reveal harmonies between the developing graphophilia of the human brain and the neural dynamics induced by child-like states of abstraction in adults. Interventional neurotech, such as transcranial electromagnetic stimulation devices, may be able to deepen the experience of PPPiP by potentiating visual and emotional receptivity

Additionally, building off the group neural synchrony experiments of [Dikker et al. \(2017\)](#), and using larger sheets of paper, it would be interesting to test the hypothesis that Group Pen Play in Parallel (GPPiP) could allow larger social groups or polycules to receive some of the same integrated neuropsychological benefits of PPPiP ([Wadeson 2010](#), chp. 21).

5. Conclusions

Rapid developments in sex-tech appear poised to fundamentally disrupt a million-year evolutionary history of low-tech human-human intimate relationships ([Sapolsky 2017](#)). Relationship quality remains a key determinant of human health and well-being, and a plurality of academic and non-academic scholarship converge on the conclusion that the emotional benefits of sexual fulfillment paradoxically cannot be reduced to just the sex. Here we have introduced Partner Pen Play in Parallel (PPPiP), the structured use of joint improvisational drawing in intimate contexts, as a scalable and low-cost relationship improvement modality. We build off of previous clinical art therapy work to encourage the dissemination of artistic improvisational relationship practices outside of counseling situations. Despite overtures of a silicone/silicon sex bot technosexual future, perhaps the future of relationships is textosexual after all.

We invite all those who have read this far to try PPPiP for themselves and develop new variations on this theme.

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Appendix Examples of “Fontplay” PPPiP’s

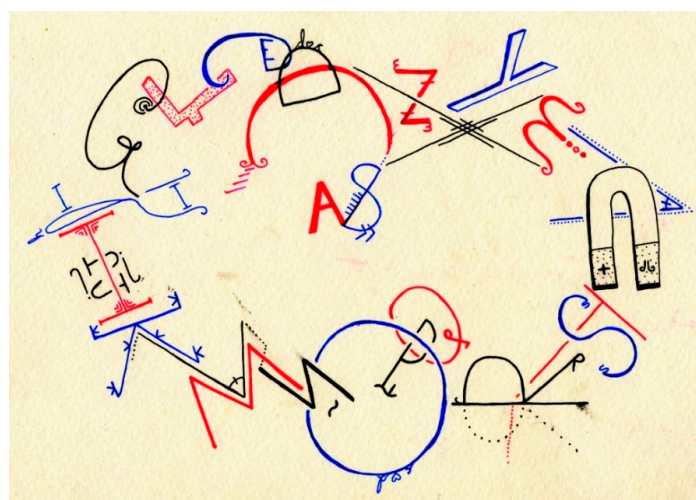


Figure A1. “Alphabet”. The 26 letters of the English alphabet in a counter-clockwise loop. Red, blue and black pens, white paper. Drawing made by authors. License: Creative Commons Attribution-NonCommercial 4.0 International.

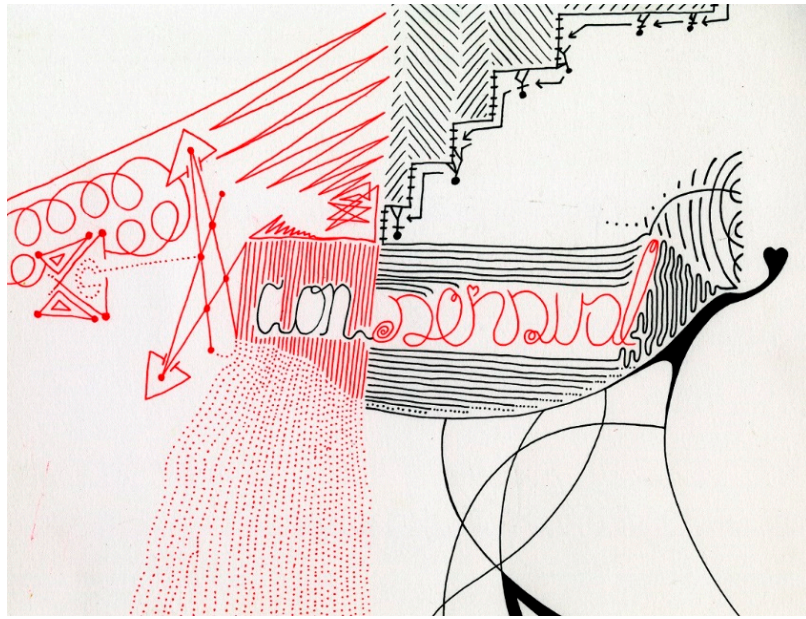


Figure A2. “Con-sensual”. Juxtaposition of black/red, curved/straight, patterns/negative space. Red and black pen, white paper. Drawing made by authors. License: Creative Commons Attribution-NonCommercial 4.0 International.



Figure A3. “Каприз (Tantrum)”. Bilingual, narrative elements. Red and black pen, white paper. Drawing made by authors. License: Creative Commons Attribution-NonCommercial 4.0 International.

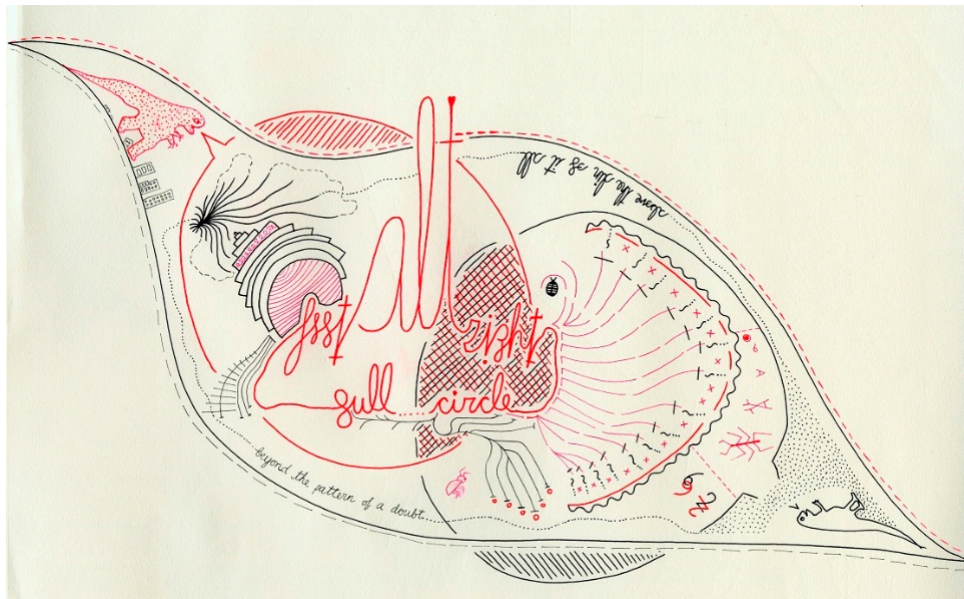


Figure A4. “Full Circle”. A literal conversation on paper. Red and black pens, white paper. Drawing made by authors. License: Creative Commons Attribution-NonCommercial 4.0 International.

Appendix Examples of “Pure Abstraction” PPPiP’s



Figure A5. “Two Things”. Pure abstraction. Red and black pens, white paper. Drawing made by authors. License: Creative Commons Attribution-NonCommercial 4.0 International.



Figure A6. “Thinking.”. Silver and gold pens, black paper. Drawing made by authors. License: Creative Commons Attribution-NonCommercial 4.0 International.

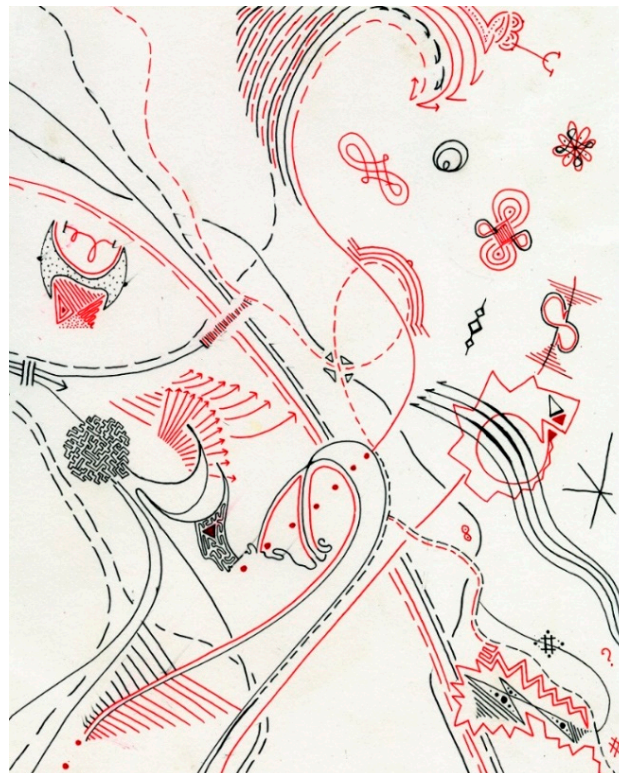


Figure A7. “Wave”. Red and black pen, white paper. Drawing made by authors. License: Creative Commons Attribution-NonCommercial 4.0 International.

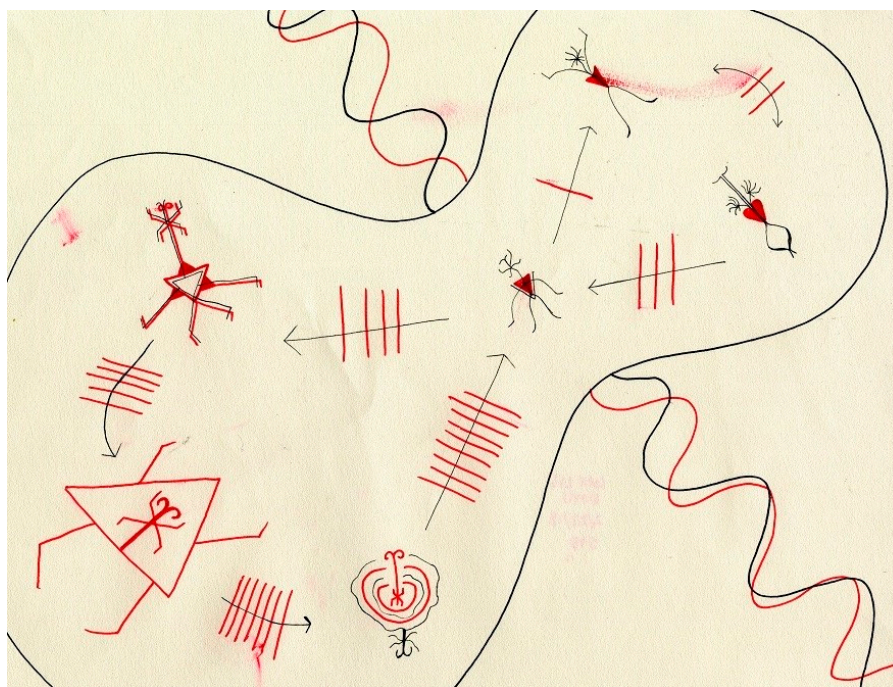


Figure A8. “Figure 8”. Red and black pen, white paper. Drawing made by authors. License: Creative Commons Attribution-NonCommercial 4.0 International.

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